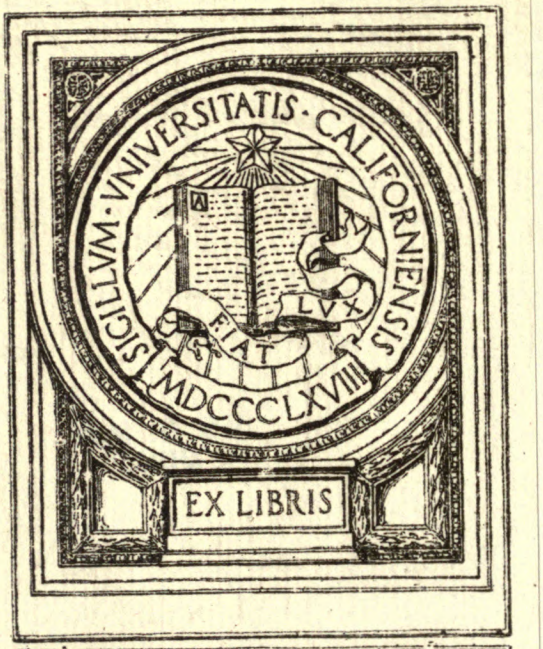
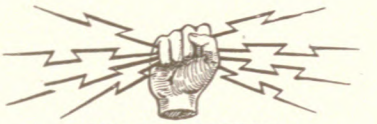
EMERGENCY SIGNALING



EMERGENCY SIGNALING



TRADE MARK REGISTERED

The Gamewell Fire Alarm Telegraph Co.

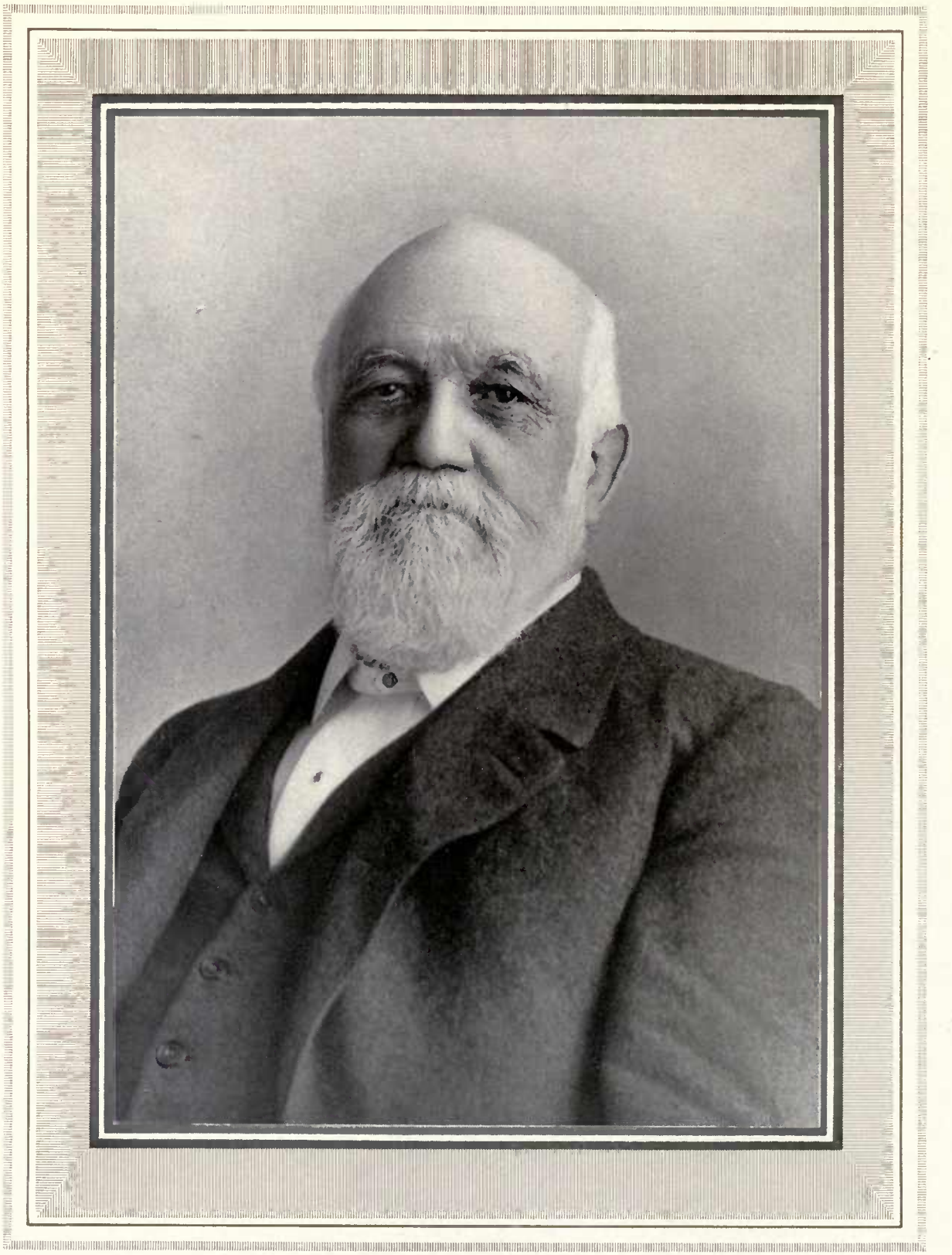
No. 70 EAST 45 TH STREET, NEW YORK

1855
1916

Foreword

To those who have devoted the best years of their lives, and who have given unsparingly of their hearts and brains and hands towards the development and perfection of the Art of Fire Alarm and Emergency Signaling, this volume is dedicated.

Many of them have "crossed the Great Divide"; but the work of all remains to render constant service in the protection of life and property. Theirs was and is the spirit of the pioneer; the paths they blazed are open to all mankind. When new conditions require to be met, new pathways will be found; and the Engineer of the future will take his inspiration from the spirit of those who did their work in the early days, without precedent to guide them, but with abiding faith.

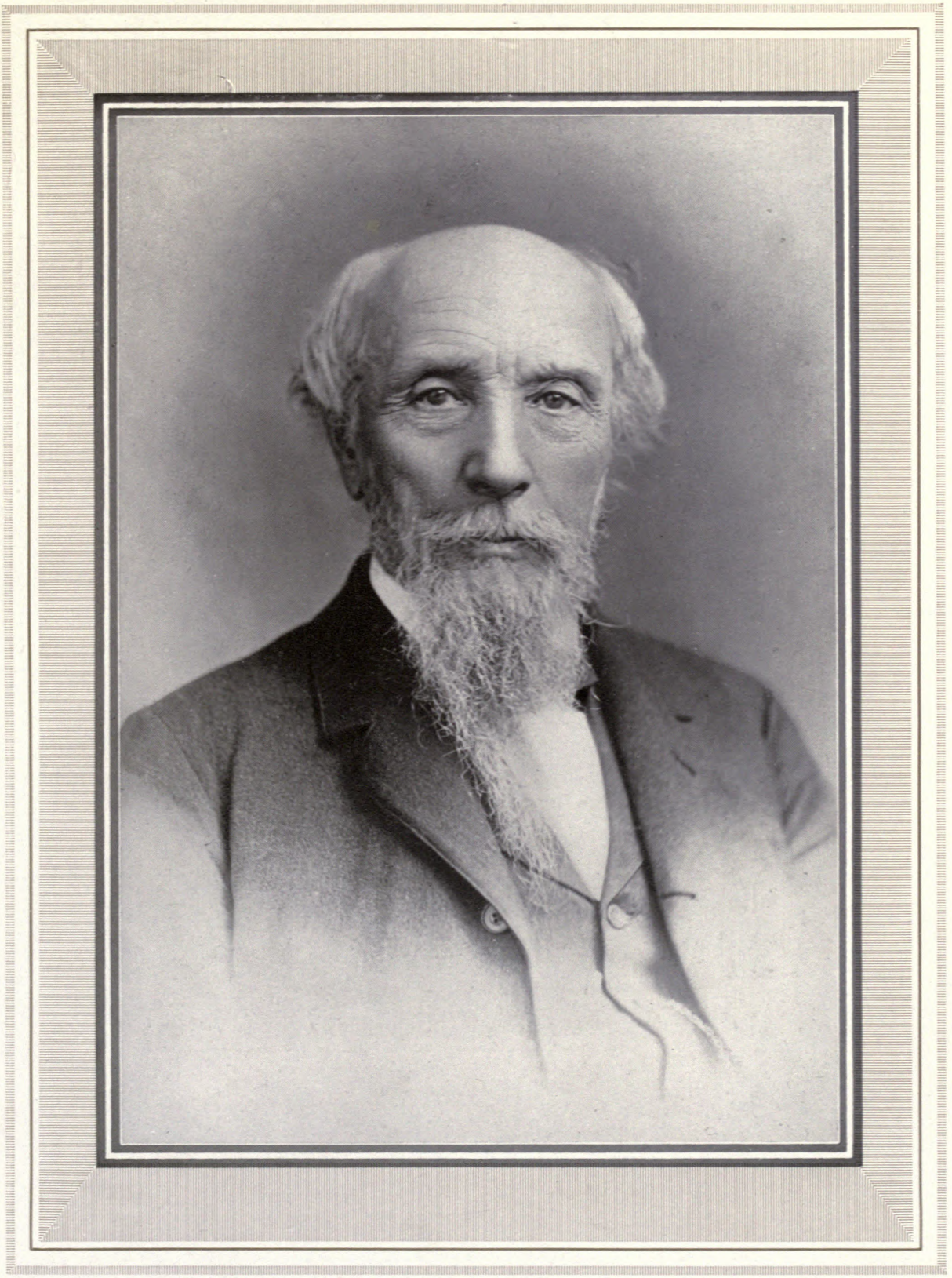


JOHN N. GAMEWELL

BORN AT CAMDEN, S. C., 1822

DIED AT HACKENSACK, N. J., JULY 19TH, 1896.

He was the founder of the Gamewell Fire Alarm Telegraph Company. In 1855 he saw the Channing and Farmer fire alarm system, recognized its value, and devoted his entire business life to its introduction and improvement. He will always be considered as the Father of the Fire Alarm Telegraph.



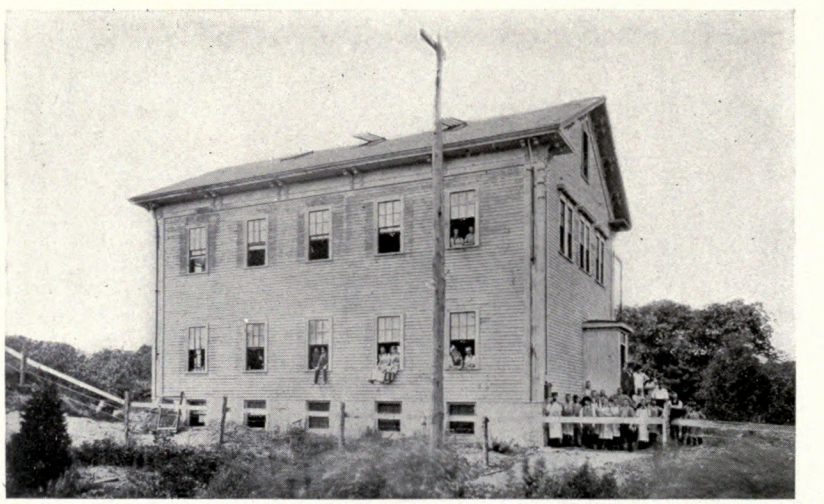
MR. JAMES M. GARDINER

BORN IN SCOTLAND, 1819

DIED IN NEW YORK CITY, FEB. 25, 1915.

In his early days was a clock maker. He became associated with John N. Gamewell in 1856 and remained with the Gamewell Fire Alarm Telegraph Company until his death at the ripe old age of 95. He invented the well known Gardiner Fire Alarm Box and his other inventions were of great value in the development of Fire Alarm Telegraphy.

The First Factory of
The Gamewell Co.
1869 1885



CHAPTER I.

Introductory

THE HISTORY of the Art of Fire Alarm and Emergency Signaling covers a period of approximately sixty-five years. As recently as 1850,—a period well within the memory of many men still in active life, electric firealarm systems were unknown.

Today, the Fire Alarm Telegraph System is known in many hundreds of communities in the United States, and the Police Telegraph and Telephone System in many of the important cities.

The public fire-alarm system has formed the foundation on which has been built up all over the country, a large and rapidly extending signal service, by means of which alarms of fire are transmitted directly from the interiors of buildings, both by manual and automatic operation. Tens of thousands of important properties are so protected, and human life and business activity safeguarded against loss. The public Police Telegraph and Telephone System has also been extended, so that in emergencies requiring its use, its great value may be more quickly utilized.

While these Emergency Signaling Systems have come to be regarded as essential to the safety of life and property in cities and towns, they are in physical evidence to the average citizen, only in the signal box on the street corner, or within a building. The familiar red or blue box is to him but a means to an end. He does not realize the ceaseless toil, the patient study, the bitter disappointment and the final brilliant success of those old pioneers who dreamed and planned

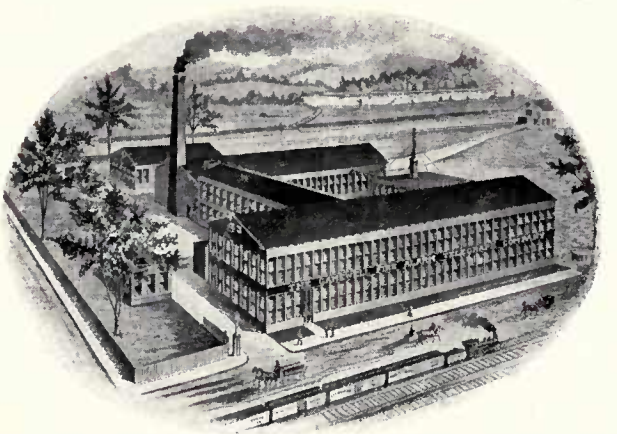
and worked,—who builded and destroyed and builded again,—in order that the benefits of modern protective systems might be his.

New York City was the first community to attempt to give information by bell or otherwise, as to the location of fires. In 1845 the City was divided into districts. A watch-tower and bell was provided in each district, and a watchman was on duty in each tower at all times. Each district was numbered, so that when these numbers were sounded on the tower bells, the members of the volunteer fire companies,—and the general public as well,—were informed as to the section of the City in which the fire was.

The sounding of an alarm of fire in those days, was a slow and tedious process. If a watchman, high up in his tower, discovered a fire in his district, he would sound its number on his bell by hand. This signal would be heard by the watchman on the next tower, and repeated by him; and in this manner, the alarm was gradually announced to the entire city.

If fire was discovered within a building where it could not be seen by the watchmen, its existence was announced by the occupants of the building shouting from windows, or running into the streets and crying "Fire!" until the attention of the watchman in that district was secured.

As the alarm sounded, the red-shirted volunteers would



It became necessary to have larger quarters and the Gamewell Company moved into this plant. 1885 to 1904.

In 1914 the large fire proof addition was added making the plant the largest in the world engaged exclusively in the manufacture of emergency signaling apparatus.

rush to the fire houses and proceed to drag their clumsy hand-pumping apparatus to the scene, shouting and encouraging each other to the last ounce of effort to reach the fire as quickly as possible.

The progress which has been made in a period of less than the allotted lifetime of "three score years and ten," in the Arts of Fire Alarm Signaling and Fire Extinguishing,—each of which has kept pace with the other —is truly remarkable.

One now rushes to a box on the corner,—or pulls the lever of an interior fire alarm box,—and in a few brief seconds high-powered motor apparatus is racing through the streets to a certain specific street corner or building; and in a few minutes more, powerful streams of water are being directed against the fire, through water-towers, cellar pipes and numerous lines of hose.

It is therefore fitting that this book should be published as a tribute to those who have given the Emergency Signaling Systems to humanity, and thus made possible the high development of the modern Fire Department; and that everyone may have the opportunity of appreciating all of the human activity which has been expended in bridging the gap between the watch-tower of 1845 and the Fire Alarm Telegraph System of to-day.

CHAPTER II.

The Birth of the Art

While Charles Robinson of New York was the first to use the Morse telegraph for signaling the existence of fires, his application of the principle was confined wholly to telegraphing between police stations and engine houses in New York City, and the watchmen in the eight fire districts in which the city was divided. This was in 1850; but several years earlier,—in 1845,—Dr. W. F. Channing of Boston, who had read of the early experiments of Professor Morse, published an article in the Boston Advertiser describing his method of applying the electric telegraph to the transmission of alarms of fire from distinctively numbered street stations, and of striking these signals on the tower bells by means of mechanical devices. Thus the Art of Fire Alarm Telegraphy was born; and in 1851 the City of Boston became interested in Dr. Channing's plan, and appropriated the sum of $10,000 for experimental use in connection with it.

It was proposed to establish a system of numerous boxes on the streets, connected with a central station by wire; and to run other circuits from this central

station to the various bell towers. When a signal box on the street was operated, its number would be "telegraphed" to the central station, and transmitted from there by operators to the watch-towers, where the signal would be simultaneously struck on all the bells.

In working out his plan, Dr. Channing associated himself with Moses G. Farmer who was regarded as the most expert electrical mechanic of the day. The electrical and mechanical details were worked out to the best of their ability, and in 1852 the first alarm of fire was electrically transmitted to and from the central office in Boston, and sounded on the nineteen tower bells scattered throughout the city.

Not only did Channing and Farmer have to contend with the difficulty,—almost impossibility,—of securing mechanics skilled in electrical apparatus, and with the operating defects consequent upon exceedingly crude and clumsy apparatus, but with the bitter hostility of the members of the volunteer fire department who were opposed to the improvement, and to whom many interferences with the wires and apparatus were chargeable. The system would have been abandoned, but for their wonderful faith, persistence and personal devotion.

In 1855, John N. Gamewell of South Carolina, heard Dr. Channing deliver a lecture on the Fire Alarm Telegraph in Smithsonian Institute in Washington. With a clearness of vision which was one of his most striking characteristics, he saw the possibilities inherent in the first experiment in Boston, and soon purchased from Channing and Farmer the rights to their inventions in the Southern States; in 1859 he purchased their patents for the rest of the country.

From 1861 to 1865 during the Civil War period, but little was done in the way of improving and extending the use of the Fire Alarm Telegraph; but shortly after the war, Mr. Gamewell actively pushed the business through John N. Gamewell & Company and afterwards through a corporation which a few years later became the Gamewell Fire Alarm Telegraph Company.

From that time up to the present, the use of the Fire Alarm Telegraph has been steadily increasing, and manufacturing facilities have necessarily kept pace with this progress, as will be seen from the cut of the first "Gamewell" factory and of the present one.

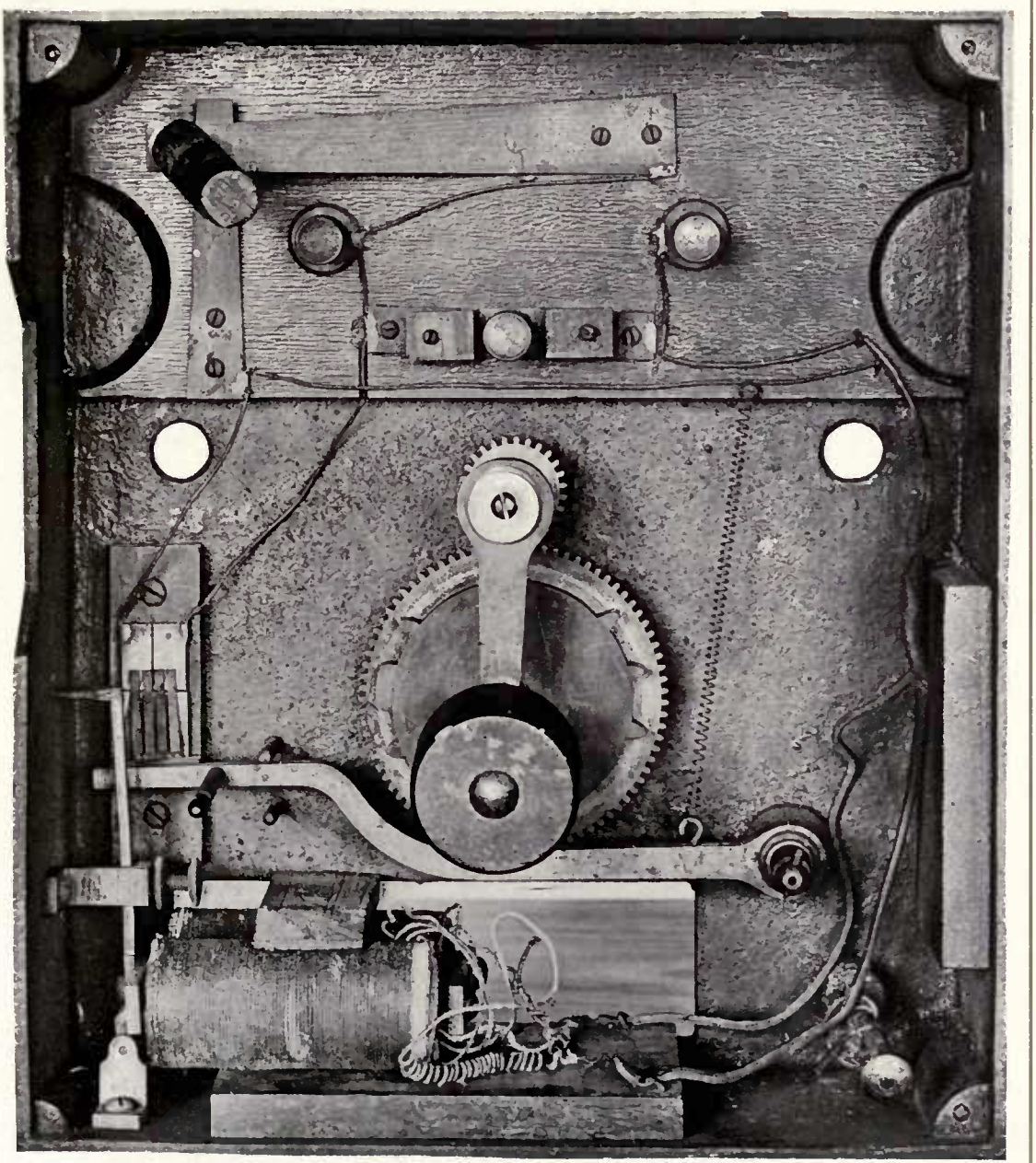
There is no greater contrast between the first locomotive and train which ran for a few miles through the Mohawk Valley in New York in 1839, and the modern express train with its steel palace cars and complete equipment, than between the original fire alarm system in the City of Boston and that in use today.

CHAPTER III.

The Fire Alarm Signal Box

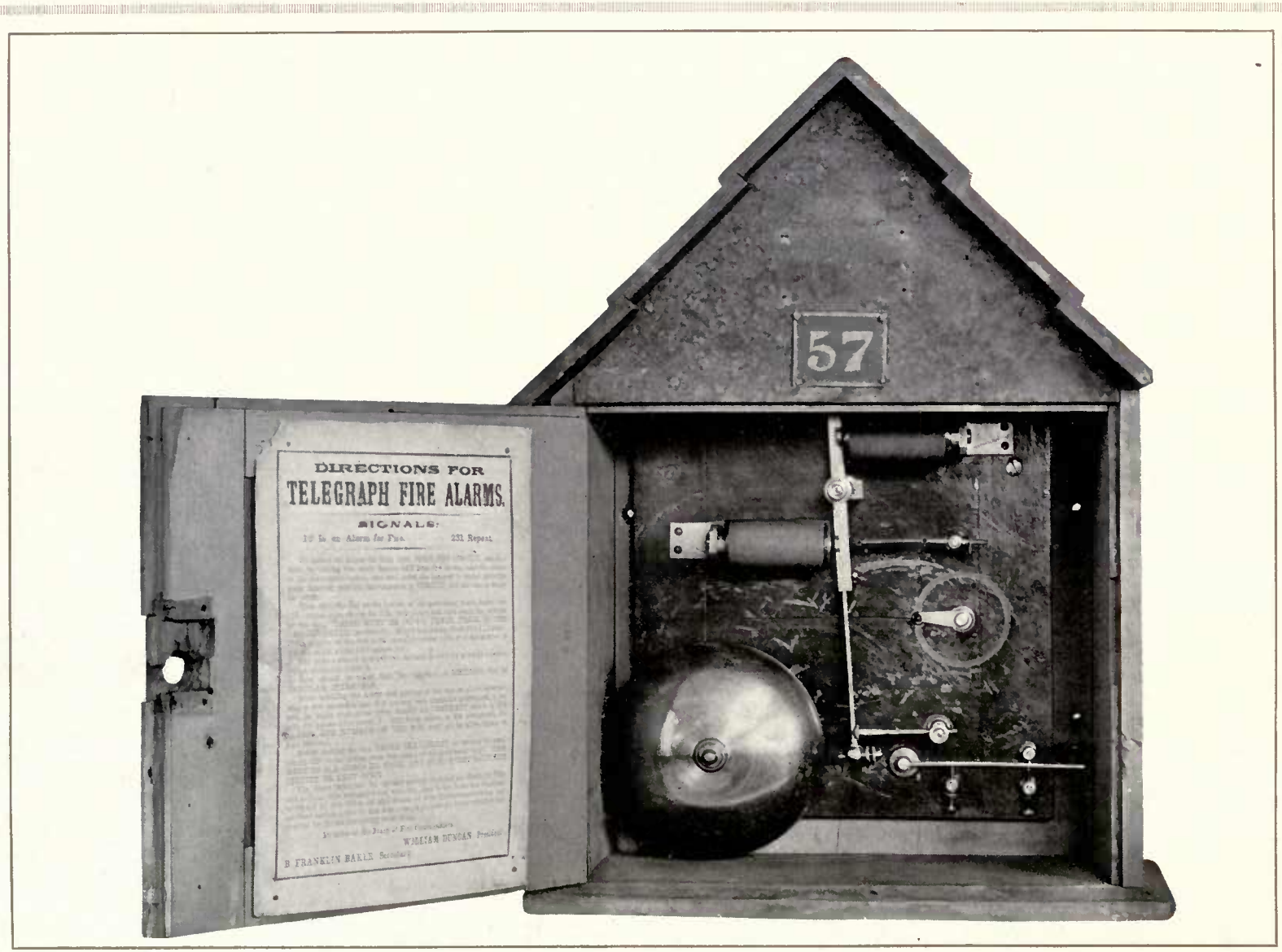
The various stages of development through which the fire alarm box has passed since 1851, are of extreme interest. They have all been the result of service experience; their defects could hardly be foreseen, and had to be remedied as rapidly as they developed.

The original Boston box contained practically nothing but a telegraph key, opened and closed by the manual rotation of a notched wheel fastened directly to a shaft having a handle. The instructions for sending an alarm of fire, were "Turn the crank six times



FIRST FIRE ALARM BOXES KNOWN.

This and the illustration on the following page are taken of one of the first fire alarm boxes ever used. They date back to about 1855, when Channing and Farmer first introduced a fire alarm system in Boston. The method was to turn the handle six times, but it soon proved itself to be unpractical and the system was considered a failure.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DIRECTIONS FOR
TELEGRAPH FIRE ALARMS.
SIGNALS:
WILLIAM DUNCAN
B FRANKLIN BAKER

slowly." It was soon found that persons would turn this crank so rapidly that the operators at the central office could not distinguish the signal. The instructions were then changed to "Turn the crank twenty-six times slowly," but with little better results.

The advent of the automatic box,—one in which the notched signal wheel was rotated by clock-work mechanism at a uniform rate of speed,—was gladly hailed by those who were struggling with the uncertain means of transmitting signals; but this box, also, when subjected to the test of actual service, was found to contain features of unreliability, in that a manipulation of the starting lever after the mechanism had been set in motion, would break up the signal.

In 1867 Charles T. Chester of New York patented a device intended to prevent this trouble, but it was only partially successful; and it was not until 1869 that the difficulty was overcome through the patent of Crane and Rogers taken out in that year, and covering what was known as the "non-interference pull."

As further experience under service conditions was encountered, the fact was developed that if two boxes on the same circuit were operated at or about the same time, an interference of signals would result. Much time and thought was expended on the problem of devising means for preventing this, and in 1871 Mr. Gamewell patented a method for interlacing circuits in such a manner that adjoining boxes were carried on different circuits, so that should two such boxes be operated at or about the same time, no confusion would result. This was regarded as a step forward in the art, but not by any means as solving the problem, as two boxes operated together would still interfere, if on the same circuit.

It was also found that the practice of interlacing circuits increased greatly the mileage of wire in a system, and brought numerous troubles in its train which contained serious possibilities of losing alarms in one direction, while intended to preserve them in another.

For nearly nine years more experiments were being constantly made and as constantly abandoned, in attempting to devise means for preventing an interference between boxes in a manner which would be reliable, and which would not introduce circuit complications. In 1880 a great forward impetus was given to the Art, when James M. Gardiner patented a fire-alarm box mechanism containing within itself devices which safely accomplished the results which had been so earnestly sought. The "Gardiner" box as it has always been called since its invention, solved the problem, came into wide-spread use, and established a solid reputation for reliable service.

As fire alarm boxes came into more general use, and as areas to be protected largely increased, it was appreciated that the "Gardiner" box, with its practical and reliable non-interfering features, did not meet certain conditions which were being developed by service, and which had hitherto been unknown.

Several instances were noted where two different boxes on the same circuit were pulled simultaneously,—or nearly so,—for two different fires. The features of the "Gardiner" box prevented one box from interfering with another, but they did not permit both alarms to be automatically transmitted; one alarm only resulted, and the second box had to be pulled over again after the first had finished signaling. Delays were thus occasioned, and the new problem was energetically attacked.

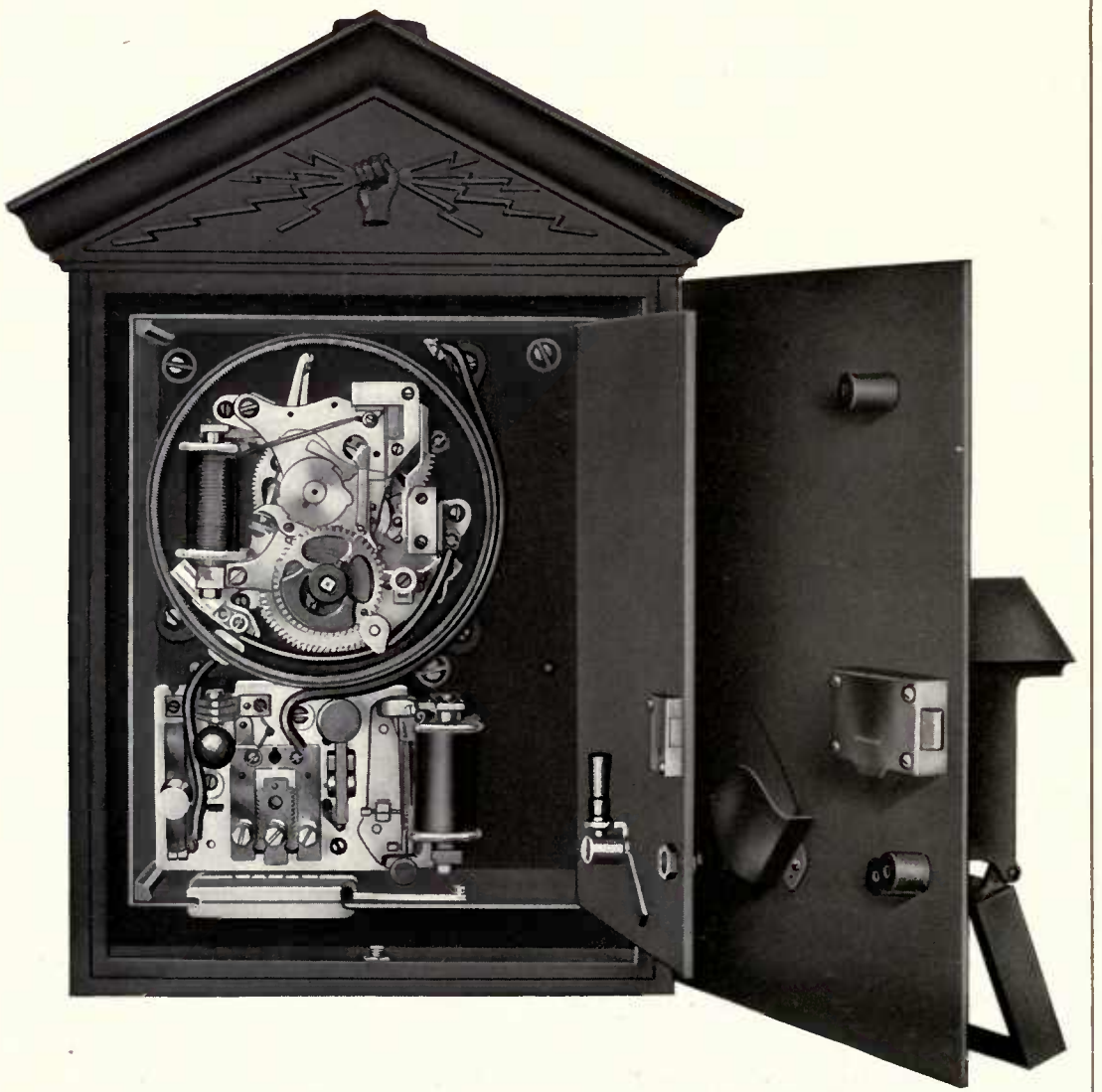
It was not until 1889, however, that the "Successive" box was invented and patented. Through this invention of J. J. Ruddick, boxes not only contained the non-interference feature of the "Gardiner" box, but were made to succeed each other automatically and with the initial operation, should two or three or even more boxes on the same circuit be pulled at or about the same time. Like all other pioneer inventions in history, the Ruddick box contained some defects which were made apparent by actual use. These have been successfully overcome by improvements from time to time, which have culminated in the so-called "Peerless" box which is illustrated herein.

It is of course impossible in the limited space available in a book of this kind, to do more than outline the most important and epoch-marking advances in the Art. The foregoing treats more particularly with the signaling operation of the fire alarm box; but even a brief sketch should contain mention of some of the steps which have been taken to safeguard the signaling mechanism against injury.

The original boxes had no protection whatever against damage by lightning; and the overhead trolley and electric light and power wire had not come into use to require special devices and methods for preventing damage arising from the accidental contact of such wires with the fire alarm circuits.

The use of wood for insulation in boxes, and for mounting certain parts of them, was quite general in the early days. Later on, hard rubber was substituted; this in turn gave way to the use of slate, and in the latest type of box porcelain is used entirely.

With the advent of the overhead trolley, light and power wires so many "burn outs" of boxes occurred



THE PEERLESS POSITIVE NON-INTERFERING
SUCCESSIVE FIRE ALARM BOX.

The latest word in the art of fire alarm signaling. This box represents over 60 years of study and development in the production of a fire alarm box that will assure the correct transmission of a signal under most any known condition. It is provided with means to absolutely prevent interference from any other signal and to send in its alarm even though another signal may be using the same line when this box is pulled. It has the best known form of insulation with porcelain spools, contact bases, etc.

that it was found to be essential to protect the magnet coils and other delicate parts of the mechanism, and much ingenuity was displayed to this end. The "Peerless" box, which represents the limit of the Art as it is today, is provided with protective features which insure it against injury to a much greater extent than has been reached heretofore.

CHAPTER IV.

Inventions for More Quickly Sending Alarms

The essential factor in fighting fire is speed in getting the fire-fighting apparatus at work against it; and the Fire Alarm Telegraph has been adapted in all its stages to this requirement, so far as has been consistent with reliability of operation.

During all the years when the fire-alarm box was being brought to electrical and mechanical perfection, it was being constantly kept in mind that the highest value of the service would be realized when the time lost between the discovery of a fire and the operation of a signal box was reduced to a minimum. Naturally, the first thought on this subject followed the lines of largely increasing the number of street stations in use; but this was a matter more particularly in the realm of business, and did not offer a solution in accord with the fundamental principles of the Art, and consequently did not satisfy the ideals of those who were devoting their lives to its development.

In the early days, fire-alarm boxes were inaccessible for operation until the outer door had been unlocked by key, and opened. Keys were distributed among

adjacent stores and residences, and this custom still remains in many communities. To save the delay in sounding an alarm which was frequently occasioned by failure to readily secure a key under the above conditions, the so-called "keyless door" was invented, the first patent for a practical device of this kind being issued to a Mr. Tooker of Chicago, in 1875. By this invention, a door could be opened by the turning of a handle, this operation causing a local alarm bell within the door to sound, and thereby attract the attention of policemen and others to the fact that the box was being operated.

Before the signaling mechanism of the box could be operated, however, it was necessary to open the door and pull the inside lever. Many persons unfamiliar with the required operation, mistook the sounding of the warning bell within the door for the actual alarm itself, and omitted to start the mechanism by pulling the lever. Serious delays in summoning the fire department resulted, and brought about the invention of the automatic or "self-starting" door by N. H. Suren in 1895.

This invention overcame the only serious objection to the Tooker door, namely, the ringing of the bell by turning the handle, and prior to opening the door and starting the mechanism by pulling the lever. In the Suren door, the turning of the handle operated the signaling mechanism, but did not permit the warning bell to ring until the signal was actually in process of transmission. It was not necessary to open this door, therefore, and greater speed and certainty in sending alarms was secured.

In many communities the value of the keyless door is approximated by the use of a key-guard box attached

to the outer door, and protecting the key which is left in the lock. These key-guard boxes are provided with a glass panel, and are so arranged that when this glass is broken the front of the guard falls away, carrying all pieces of broken glass with it, and leaving the key easily accessible.

Means for operating a public fire alarm system from stations throughout a building, and thus saving extremely valuable time in calling the fire-extinguishing apparatus, were first given to the Art by a Mr. Rogers of Providence, who invented an "Auxiliary Fire Alarm System" which, however, came into but restricted use in Providence and in Boston. In 1885, through his patents covering radical improvements in Auxiliary Fire Alarm Systems, Mr. George F. Milliken of Boston, laid the foundation for the wide use of the system which was to follow.

This auxiliary system consisted of any desired number of sub-stations located throughout the interior of a building, and connected by wire with a tripping device installed in the street box. The pulling of any one of these interior stations instantly actuated the tripping mechanism referred to, and started the street box in operation. The auxiliary system employed entirely separate and distinct circuits from those of the public system, and had no electrical connection with it; and it was provided with automatic test features and other devices for preventing accidental alarms.

This system, originally installed in San Francisco, has been largely extended and is in use in many of the most important cities and towns in the United States, and has won the high regard of fire department officials as a valuable extension to the public service.

CHAPTER V.

Public Alarm Apparatus

While the original fire-alarm box was, as has been shown, what would now appear to be a simple application of the Morse telegraph, Messrs. Channing and Farmer were confronted with a more serious problem in their attempt to strike definite signals on tower bells by means of electrically controlled mechanism. They worked out a crude machine for accomplishing this result, however, and this product of their genius was the fore-runner of the electro-mechanical bell striking machine, and the whistle-blowing machine of the present day, which are successfully used in all public fire-alarm systems where an alarm is given to the entire community.

Much could be written on the successive stages through which these machines have passed in their progress from the cumbersome devices first used in Boston, to the modern machines of today. It can well be said, however, that the underlying principles of their operation which were so laboriously discovered by these old pioneers, still remain; and alterations in the machines have been more in the line of improvement in electrical and mechanical details.

Automatic winding devices for operation in connection with an electric motor are now employed in many instances, and insure the continuous working of these machines against a running down of the weights which operate them. These winding devices are so arranged that even should they be in use during the time when a signal is being struck on the bell or sounded on the whistle, no interference with the signal is occasioned.

The bell-striking machine has also been applied for

use in emergency signaling other than for alarms of fire. It is used by the Lighthouse Departments of the United States and other countries, for the striking of fog bells and the warning of ships against dangerous rocks and shoals, as well as by railroad and other companies for the proper guidance of ferry-boats and craft in entering slips or approaching docks.

These machines are so designed that they may be started and stopped from a distance by the simple pressing of a button, and will strike any desired and pre-determined signal, and continue to repeat such signal at any fixed intervals, until stopped by again pressing the starting button.

An interesting and valuable machine for fog bell service has been developed and placed in use at many important locations along the Great Lakes and important rivers, which in addition to striking and repeating signals as above mentioned, will strike a total of 10,000 blows with a single winding, and with a drop for its weights of but twenty-one feet.

In many communities where whistles have been used for sounding alarms to the public, the use of steam has been abandoned in power stations upon which the whistles were located, in numerous instances. This has resulted in the development of the Diaphone Air Horn and its related equipment, which is operated by compressed air released from reservoirs by the operation of the whistle-blowing machine. These air equipments are used in connection with motor driven compressors which are so arranged that they will automatically start in operation whenever the pressure in the reservoir drops from any cause below a pre-determined point, thus automatically insuring the presence of a sufficient pressure within the tanks.

These air horns, although primarily designed for use in connection with fire alarm systems, are employed for Emergency Signaling in other lines. They are used for fog warning signals, for railroad signaling in connection with the opening and closing of draw-bridges, and for other similar purposes where a reliable mechanism and a peculiarly distinctive sound is required.

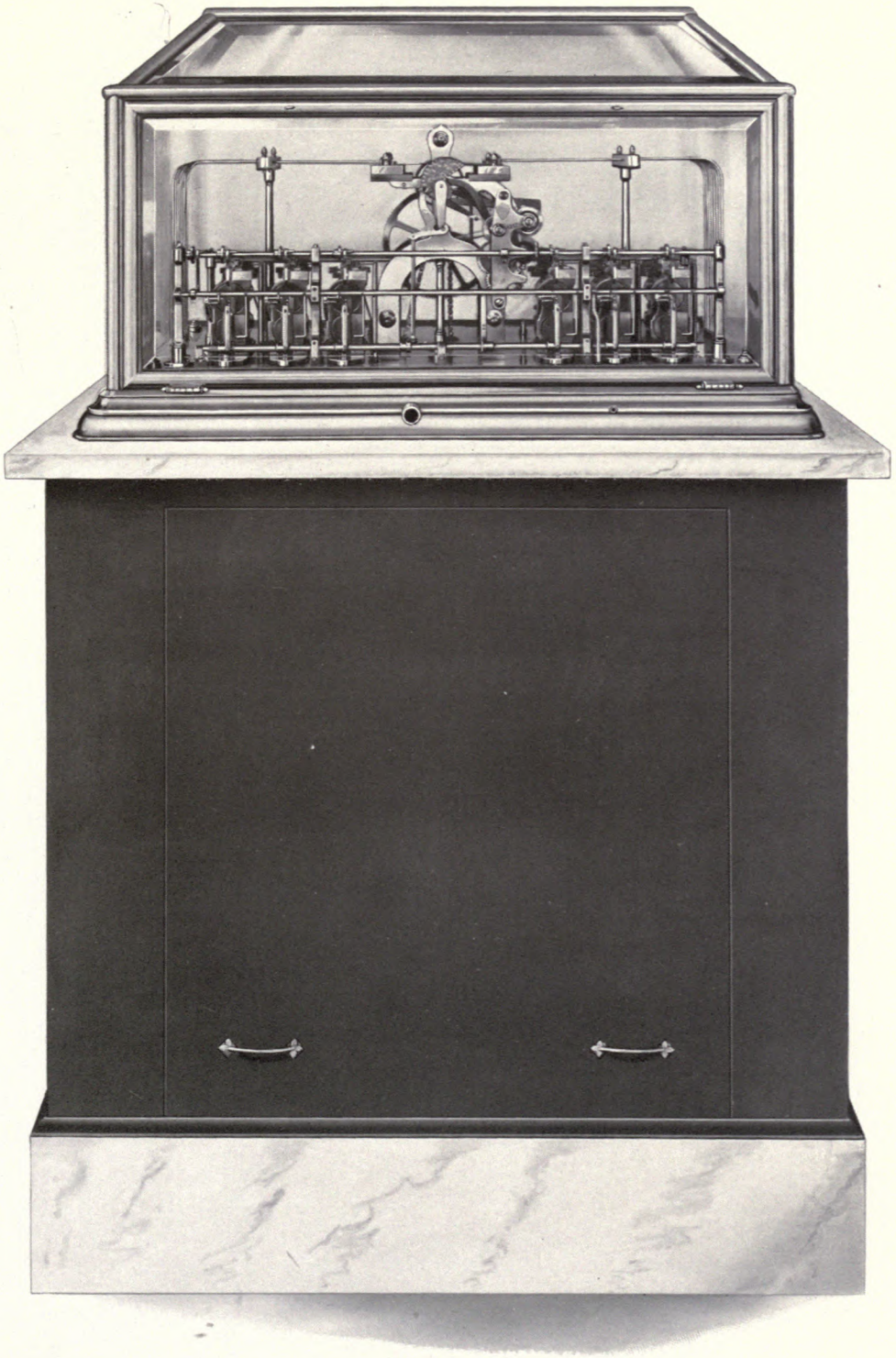
This chapter would not be complete without a reference to an interesting and valuable contribution to the Art, in the adaptation of motor driven horns for Emergency Signaling, and in the special devices required for their efficient operation. These horns are used in fire alarm systems in large properties where noise conditions cannot be successfully overcome by other sounding devices, on battle ships for fire control of the big guns, on street corners for warning traffic of the approach of fire apparatus, and for other similar purposes.

CHAPTER VI.

The Automatic Repeater

It will be remembered that the original installation of a fire alarm system in Boston required the use of a central station and the employment of operators at all hours of the day and night, for the receiving of signals from street boxes and the repeating of them to the several bell towers.

This system, therefore, was only adapted to large cities which could afford to employ operators constantly on duty, and was consequently not suited for use in smaller places. In 1859 Moses G. Farmer took out a patent for a "Village" system, but it was not until the invention of the automatic repeater by Edwin Rogers of Boston in 1870, that the Fire Alarm Telegraph was



NON-INTERFERING AUTOMATIC REPEATER

This piece of apparatus performs the functions automatically of repeating an alarm from a fire alarm box to fire apparatus houses. It is the heart of a system that is automatic and has no operators to receive and transmit alarms for fire. Its character of construction, finish and detail is representative of the finest work that human ingenuity can produce.

brought within the reach of the smaller cities and towns.

This repeater was intended for use in a community whose area was such that reliable operation of the fire-alarm system could only be secured by dividing the fire-alarm apparatus into circuits each independent of the other, and where the community was not large enough to be able to afford a central station. In such a system, the machine performed the important function of automatically repeating over all circuits, any signal originating on any one of them; thus automatically performing work which had theretofore required manual operation.

As these machines came into more general use, the same conditions of interference between circuits was noted as had been encountered and remedied in the case of two boxes on the same circuit interfering each with the other if operated at or about the same time; and as a result of this service experience, the non-interfering repeater was later developed. This machine was so arranged that in the event of boxes on different circuits being simultaneously operated, it would automatically select one of the circuits to perform the signaling, and at the same time prevent the other from interfering with it in any manner.

The invention of this machine was a long step in advance in the Art, as it made possible the practical application of the Fire Alarm Telegraph to the smaller cities and towns. It is now forty-six years since this invention was made; and the automatic repeater,—refined in its construction but with its early principles still unchanged,—is one of the standard mechanisms required in modern practice.

The invention of this machine marked an important

epoch in the Art of Fire Alarm Telegraphy, not only because it enabled the safe operation of a system of considerable size, but also because of its direct bearing on the commercial side of the Art by providing a mechanical substitute for the human operators necessary prior to its advent.

CHAPTER VII.

The Central Office

The difference between the first central office in Boston and the latest type of today,—while more apparent to the casual observer than the difference between the first fire-alarm box and the "Peerless", by reason of the extent and nature of the devices and apparatus employed,—is in reality no more marked. Inventors in both branches of the Art had to feel their way carefully and slowly, meeting conditions and overcoming obstacles as they arose, and always keeping clearly before them the vital necessity of preserving reliable operation under all possible conditions of use, so far as they could foresee or forestall them.

The original Boston office was in effect no more than a terminal point for the various circuits carrying the street fire-alarm boxes, and for the circuits running to the watch-towers and to the bell-striking machinery there. It was naturally simple in its arrangement, and crude in its apparatus. Signals from street boxes were received on clumsy bells, and the transmission of alarms over the tower bell circuits was entirely a manual operation and through the use of ordinary telegraph keys of the type then developed for telegraph purposes.

The invention of the repeater which has been referred to in the preceding chapter, was the next step in the

MODERN MUNICIPAL CENTRAL OFFICE

This installation was made in a city of about 500,000 people and represents the highest type of modern apparatus to receive and transmit fire alarm signals from all points of a city. Every known provision is made to safeguard the correct receipt and transmission to the Engine Houses of every alarm of fire without interference or confusion.

Art as applicable to central stations, and marked an era in the business which was to continue until conditions of the growth of communities demanded a return to the original central station idea with its operators.

It is interesting to note at this point, that subsequent to the installation of the first system in Boston, the invention of the repeater was forced in order that smaller communities might have the benefit of the Fire Alarm Telegraph; and that the later growth and extension of these communities again turned requirements back to the original central office principle.

The modern central office of today, with its operating panels, receiving and recording apparatus, large dial transmitters, circuit-testing facilities, and devices for protecting its delicate apparatus from injury in the event of foreign current accidentally getting on to the fire alarm circuits, is a very interesting study. Space is not available for a detailed description of all of the devices used, nor for an outline of their various stages of development; but the reader, looking at the photographs of such offices as will be found herein, can readily allow his imagination to take him back to Boston in 1851, and can picture in his mind the crude and make-shift arrangements which existed when that system was placed in service.

Until within a comparatively few years, nothing has been used to any great extent for generating electric current for operating fire alarm systems, except galvanic batteries of the well-known gravity type. Channing and Farmer, in order to secure the kind of current which they required, for a while used the direct current of a dynamo machine; and such machines have been used to a small extent since.

The general use of electricity for light and power has

made it practicable through the medium of storage batteries, to secure the required operating energy at a minimum of expense and a maximum of reliability. Specially constructed switchboards have been designed for charging and discharging storage batteries, and are provided with every device necessary to insure perfect and reliable operation.

CHAPTER VIII.

The Police Telegraph and Telephone Service

This form of Emergency Signaling Service came into existence as a natural development of the Fire Alarm Telegraph. Shortly after the first fire-alarm system was established in Boston in 1851, other communities which installed the service had, by arrangement with the fire authorities, set aside certain signals for the exclusive use of the police department. These signals consisted of a certain definite number of strokes on the tower bells, to be sounded in an emergency, and to indicate that the members of the police force were to repair to Headquarters immediately.

This arrangement, however, was limited in its value; and soon gave way to the use of dial telegraphs by means of which signals and messages were electrically transmitted from one police station to another, the Morse telegraph being used as an auxiliary.

The perfection of the telephone as a practical means of communication cleared the way for a combination of that valuable invention with some of the several forms of signaling mechanisms used for the transmission of fire-alarm signals. Such a combination was first introduced and used as an auxiliary to a police depart-

ment in Chicago in 1880, and that its value and efficiency was thoroughly demonstrated was largely due to the efforts of John P. Barrett, who was for many years Superintendent of the Fire Alarm Telegraph System of that city.

The development of the Police Telegraph and Telephone System was naturally more rapid than that of the Fire Alarm Telegraph had been, as those devoting their attention to it had the benefit of all of the work which had then been carried on for thirty years in the perfection of the latter.

The modern system of Police Telegraph, consists of patrol or signaling stations located throughout a municipality, and connected by wire with central stations or precinct headquarters, where receiving and recording apparatus is located.

Patrolmen may transmit telegraphic "on duty" signals as they patrol their beats; may send emergency telegraph signals informing the central station that they are facing a situation which requires immediate assistance; may telephone reports to their commanding officer and receive his instructions, and may, through a system of flash-lights and alarm bells, be quickly reached by their officers should occasion arise therefor.

With the advent of this service, a police department became more than a body of scattered men, out of touch with their superiors and each other; it welded them into a compact unit, quickly responsive to conditions, and controlled and directed as one man by a central authority.

The same necessity for more quickly utilizing this important Emergency Service was evident, as had been

appreciated in the case of the Fire Alarm Telegraph, and the benefits of the system were extended by the development of signaling boxes which could be installed in banks and other important buildings, and connected directly into the public circuits.

In many of the larger cities where Police Telegraph Systems are used, private companies are operating a burglar alarm service, which, however, like the forms of automatic fire alarm service referred to herein, are carried on under private ownership.

CHAPTER IX.

Emergency Signaling in Private Properties

Of late years, the interest taken by those responsible for the protection of valuable properties both against fire and the many conditions which are guarded against through organized forces of watchmen, has been widespread.

The use of the auxiliary fire alarm system which has been briefly referred to herein; of fire alarm apparatus designed along the lines of municipal installations, but used for calling out private fire brigades, and of police telegraph and telephone apparatus for properly controlling and directing bodies of watchmen, has come to be quite general in important properties.

Many of such properties in extent and in the number of their employees, are the equivalent of good sized towns; and the hazards from fire and other causes are greater, by reason of the concentration of values, and the proximity of buildings to each other. Even although such properties are well within the zone of protection of

efficient public fire or police departments, such outside assistance may not always be available; and as the most efficient work in an Emergency is usually rendered at its inception, proper signaling apparatus is regarded as essential for supplementing protective organizations, and enabling them to work at the highest point of efficiency.

Instances where emergency signaling apparatus is used for purposes other than for fire or for private police service, are too numerous to be covered herein. Some of these cases, however, are of special interest.

In New York City, for example, the many miles of underground railways are protected at frequent intervals by Emergency Alarm Boxes whose function is to instantly "kill" the third rails in an entire electrical section, when operated for an Emergency such as a collision, and to notify responsible operating officials of the location of the accident. These systems are protecting the lives of the millions of passengers who use these underground railways daily; and they have so thoroughly demonstrated their value on many different occasions, that such railroads would not operate without them.

Another notable instance is that of the New York Edison Company which utilizes fire-alarm signaling apparatus in its Emergency Service, which enables the System Operators to telegraphically transmit orders in emergencies to nearly forty sub-stations, either to all of them simultaneously, individually, or in groups as desired. This work was formerly done by means of the telephone; but the comparative slowness of this method, the liability for error, and the absence of a permanent record, caused its abandonment in favor of the Emergency Telegraph.

CHAPTER X.

In Conclusion

Emergency Telegraph Systems as they exist today, are the work of many men.

Few have been named herein, but they are the pioneers who showed the way; the men, who, with their imaginations fired with a great idea, held fast to it in the face of many trials, and left the imprint of their faith and personality all over our broad land, as an inspiration and guide for those who were to follow them.

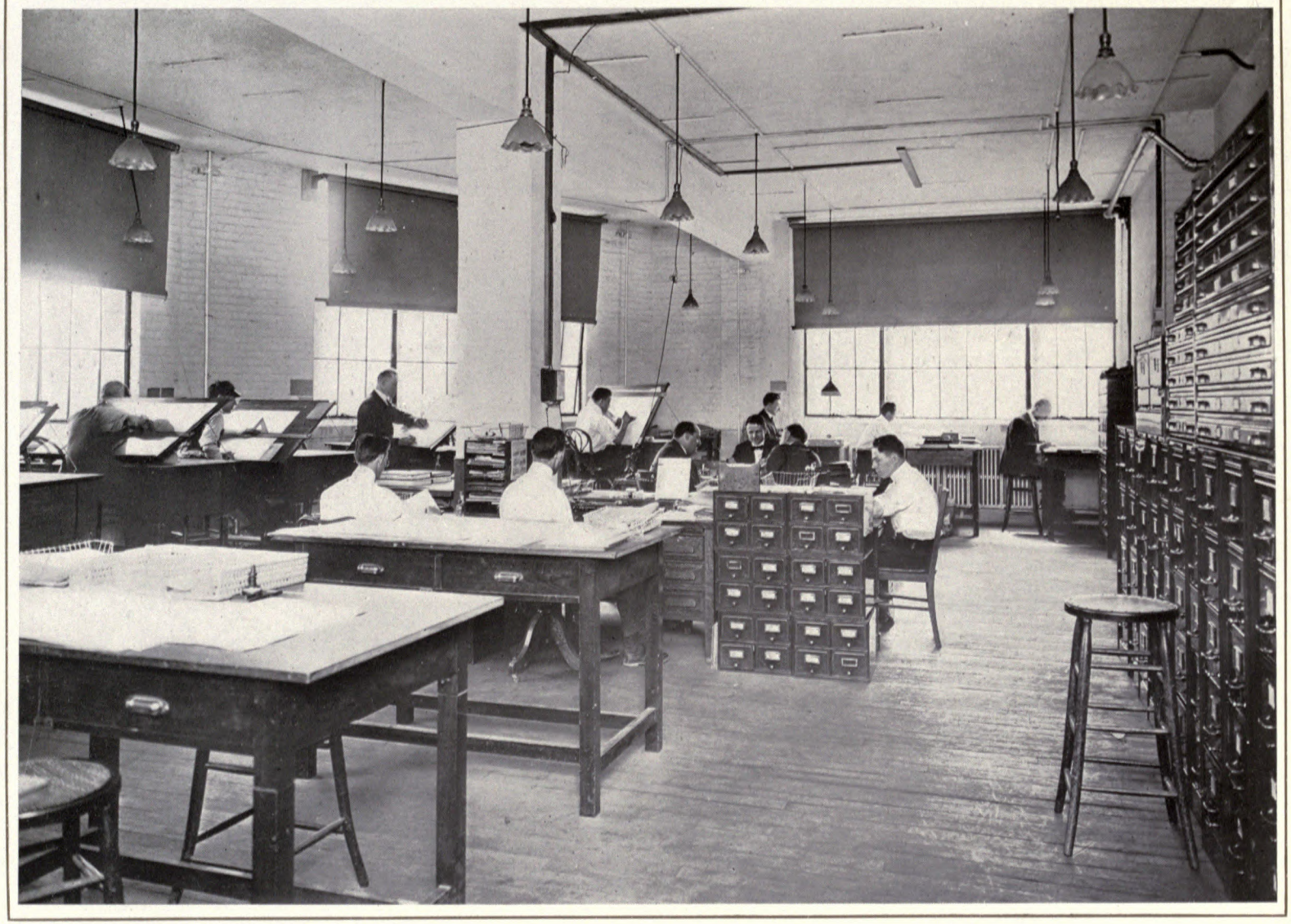
The growth of Emergency Systems has been an evolution. If it were possible to select one name from the long list of those who have devoted their energies to perfecting these systems for the benefit and well-being of all mankind, as representing him who was pre-eminently responsible for their progress, almost from the birth of the Art to its present wide development, that name would be John N. Gamewell of South Carolina.

He took the business when it was in its infancy, struggling for a foot-hold in the life of the nation, and facing adverse circumstances well-nigh insurmountable. With unfailing courage, fostered by faith and sustained by great ability, he lived to see his ideas recognized as an essential part of our national life, and died in 1896, leaving behind him the evidence of his devotion and beneficent work on nearly every street of nearly every city and town in these United States.

STENOGRAPHIC AND FILING DEPARTMENT SECTION OF OFFICE.

PRODUCTION DEPARTMENT.

In this department sales orders are analyzed and routed into the different manufacturing departments. All production orders originate here.



DRAFTING DEPARTMENT.

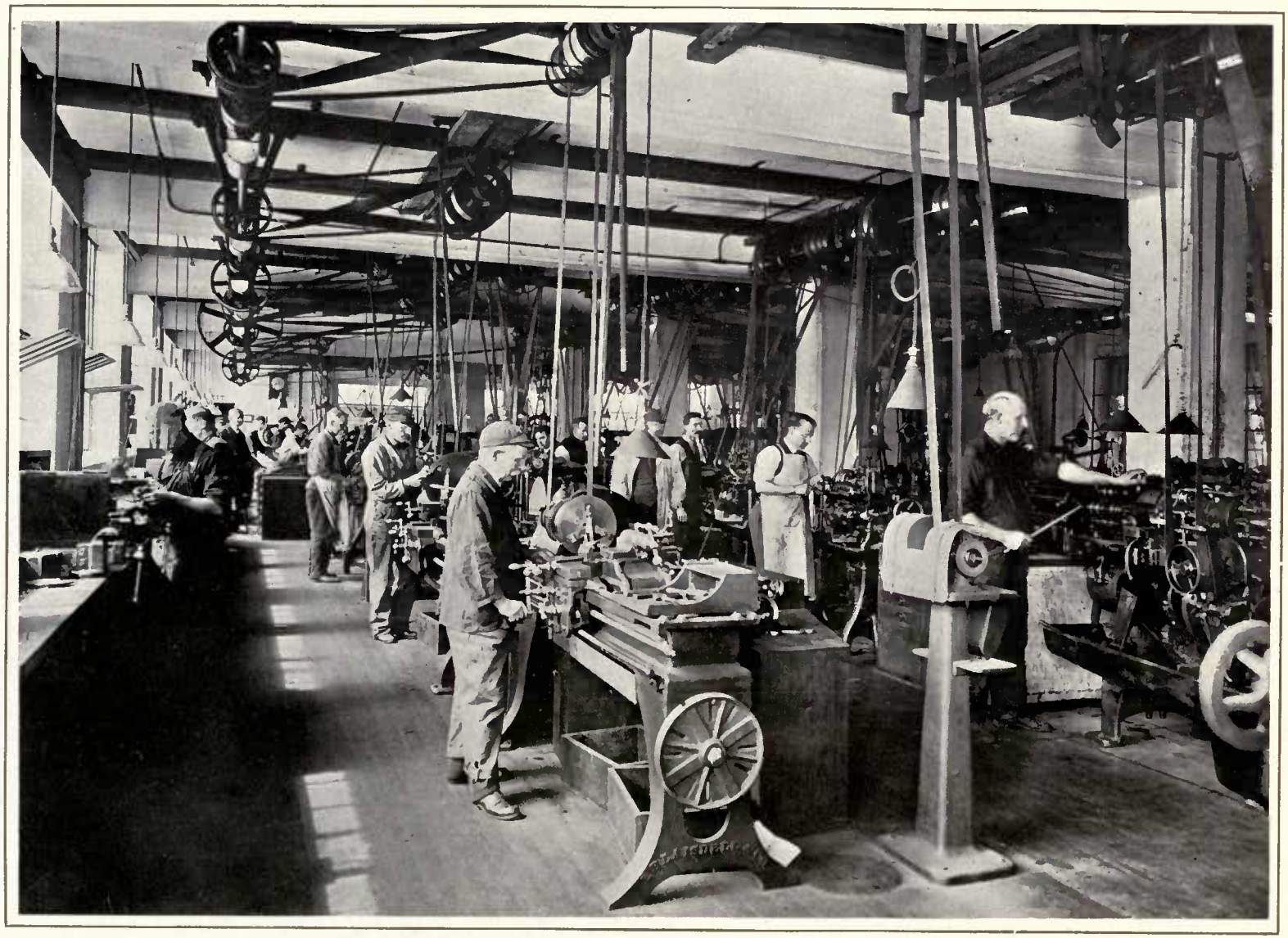
All manufactured parts are carefully detailed, and the original drawings kept on file in fire proof cases.

RAW MATERIALS STOREROOM.

All the various kinds and sizes of metals are kept in this room and each kind properly numbered so as to be readily handled.

FINISHED PARTS STOCK ROOM.

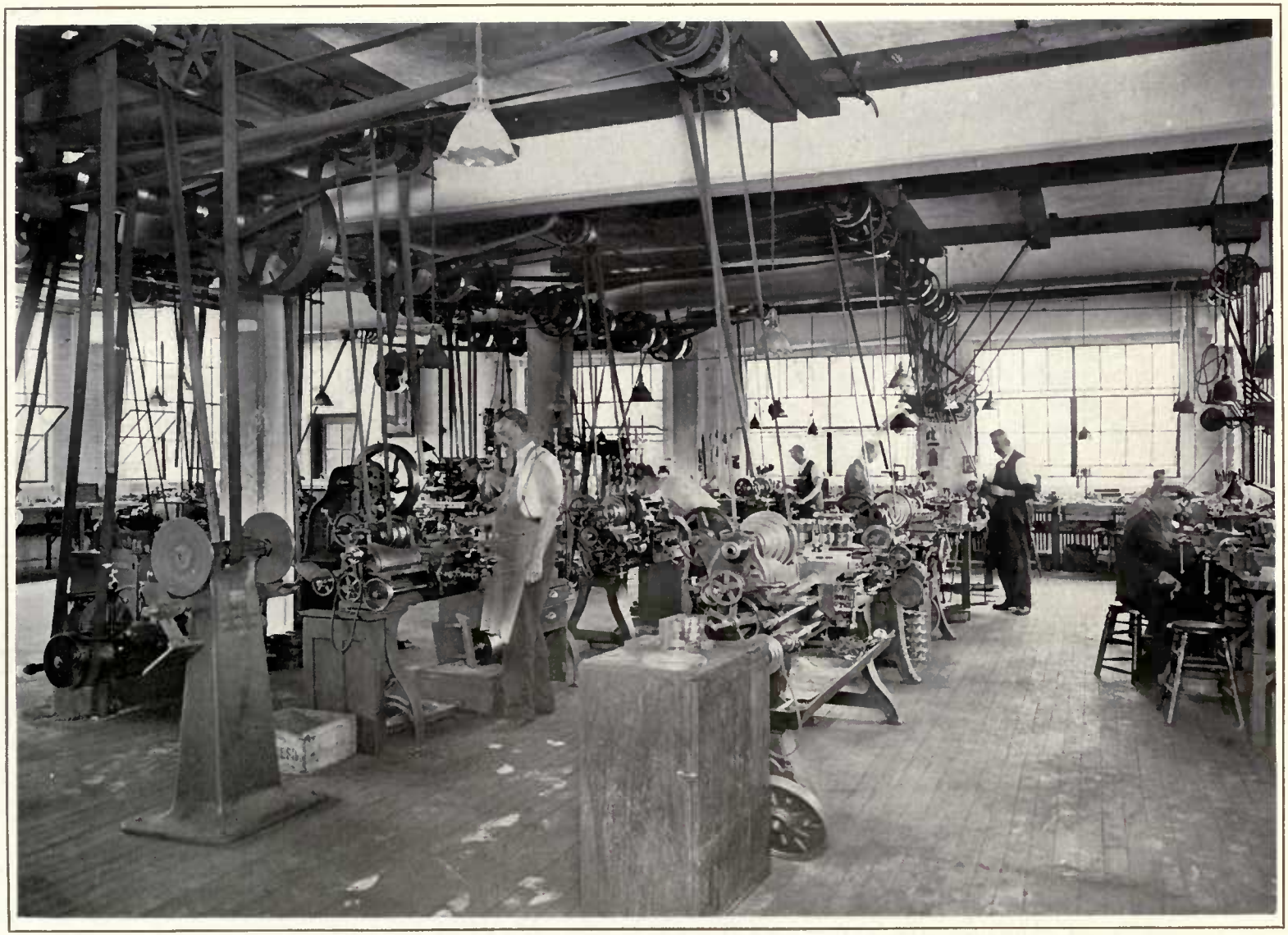
Over 25,000 parts are kept in fire proof drawers and numbered so as to be easily identified.



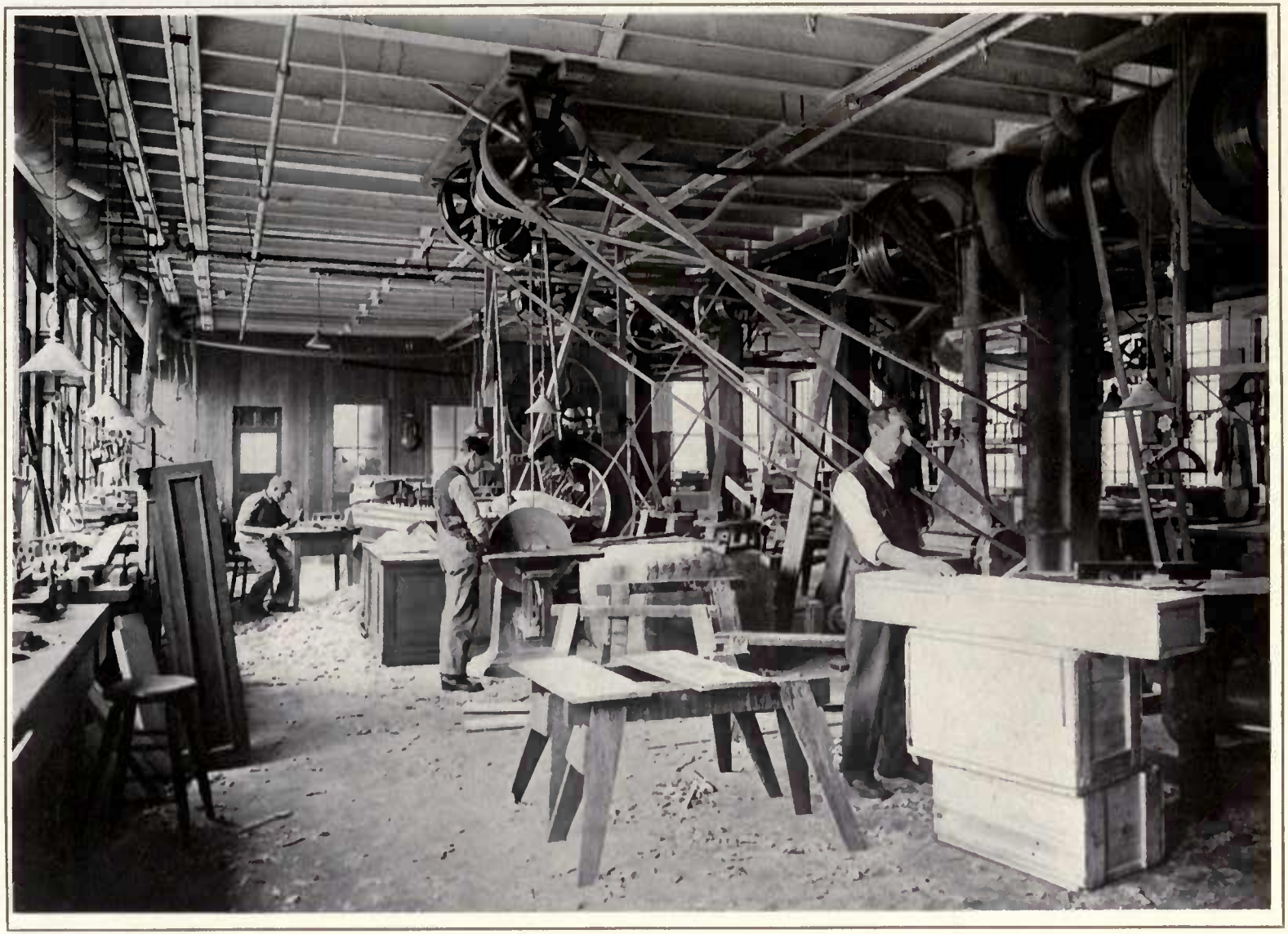
SECTION OF MANUFACTURING DEPARTMENT.

In this Department raw materials are worked up to finished parts.

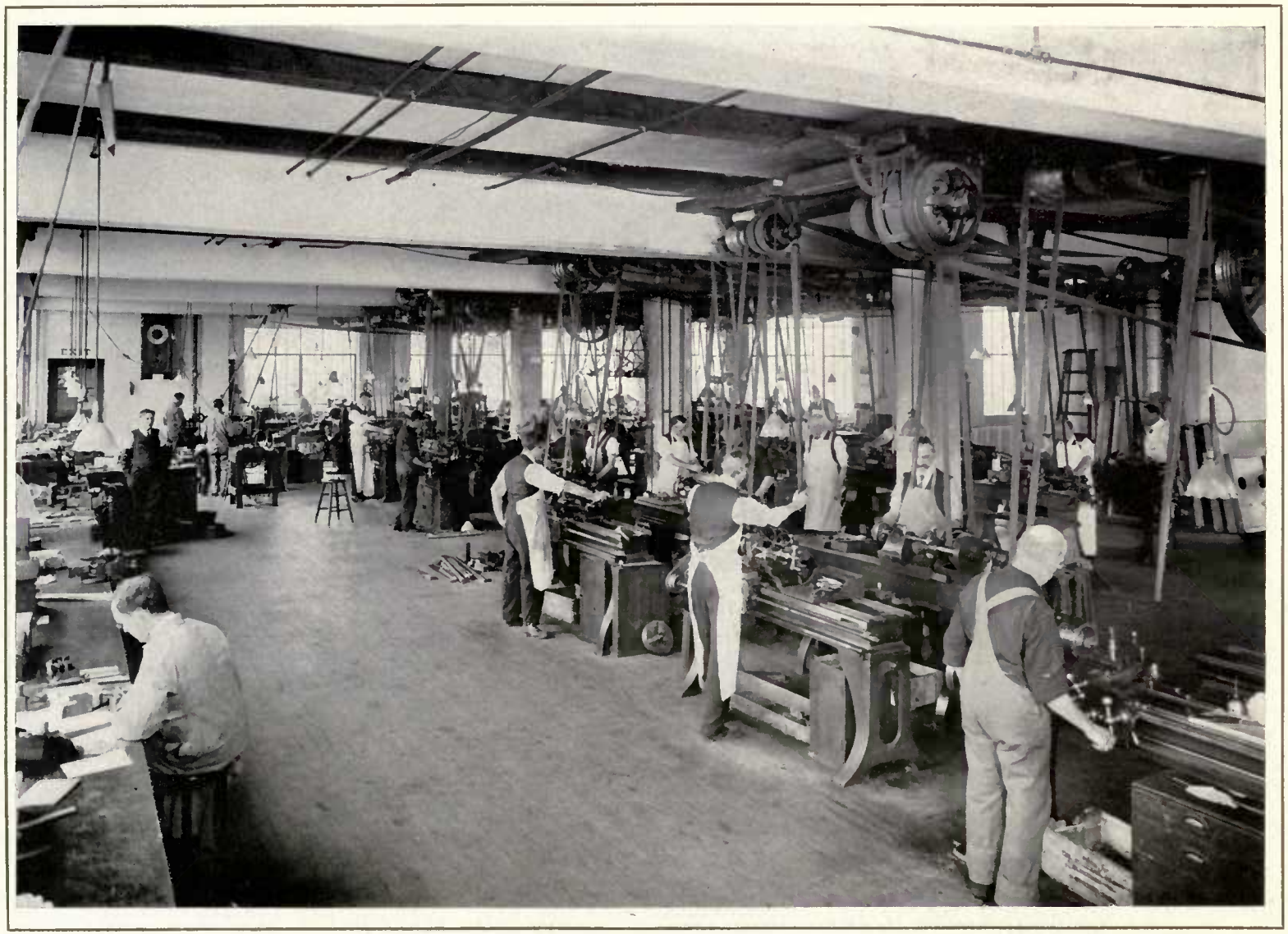
ANOTHER SECTION OF THE MANUFACTURING DEPARTMENT.



VIEW OF TOOL ROOM.

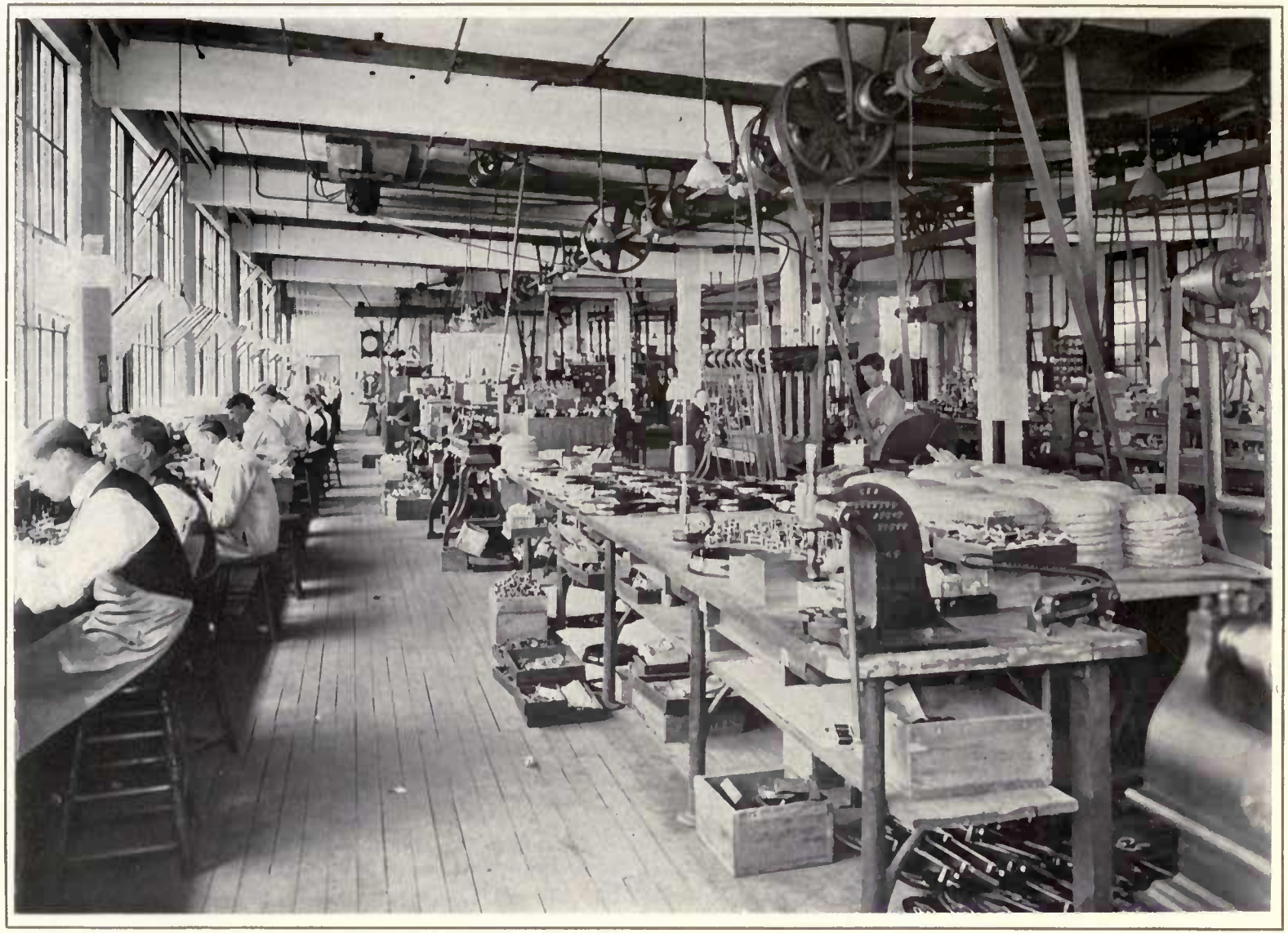


CABINET MAKING DEPARTMENT.



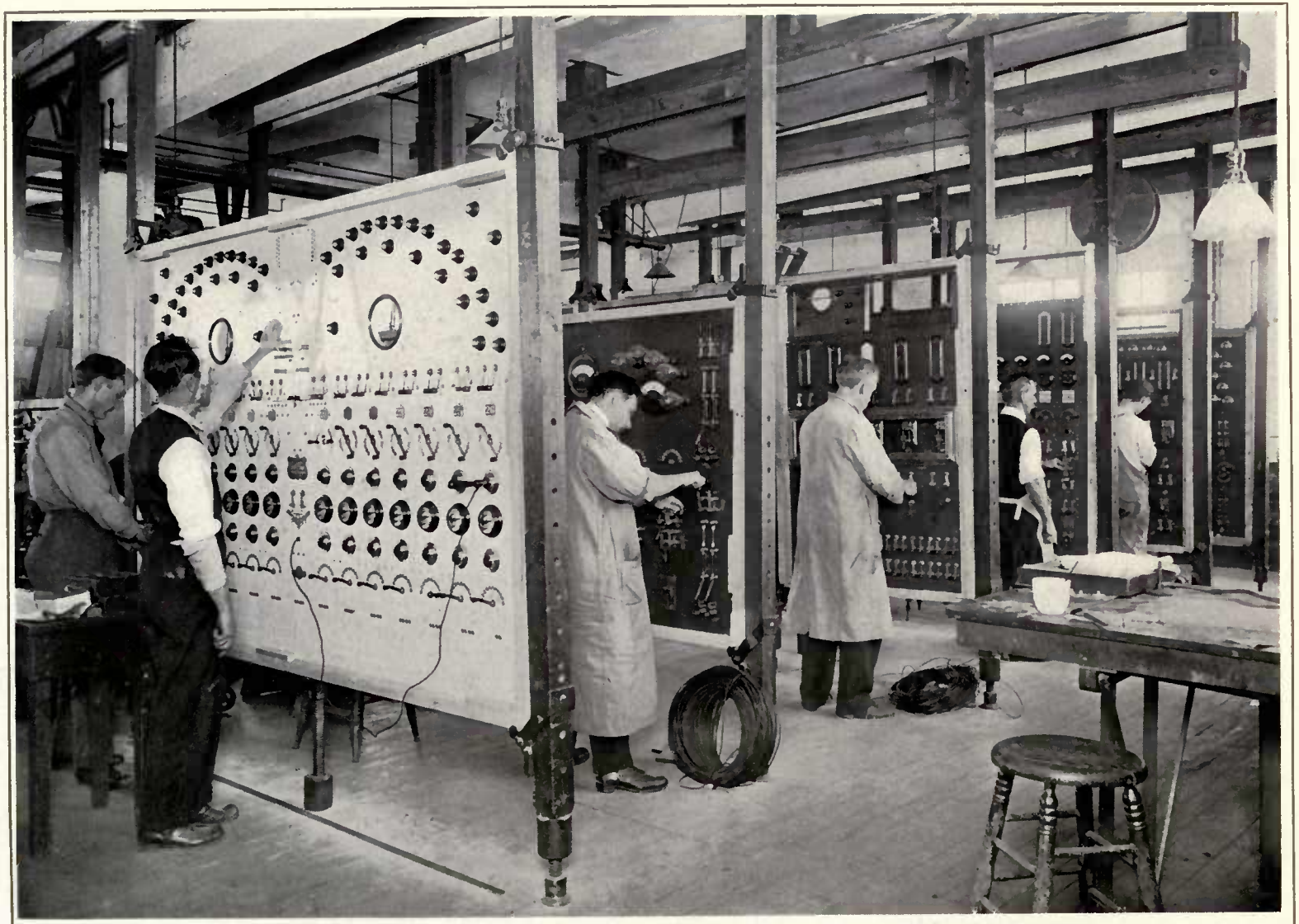
ANOTHER VIEW OF TOOL DEPARTMENT.

In this department are made all the tools and dies used in the manufacture of the apparatus.



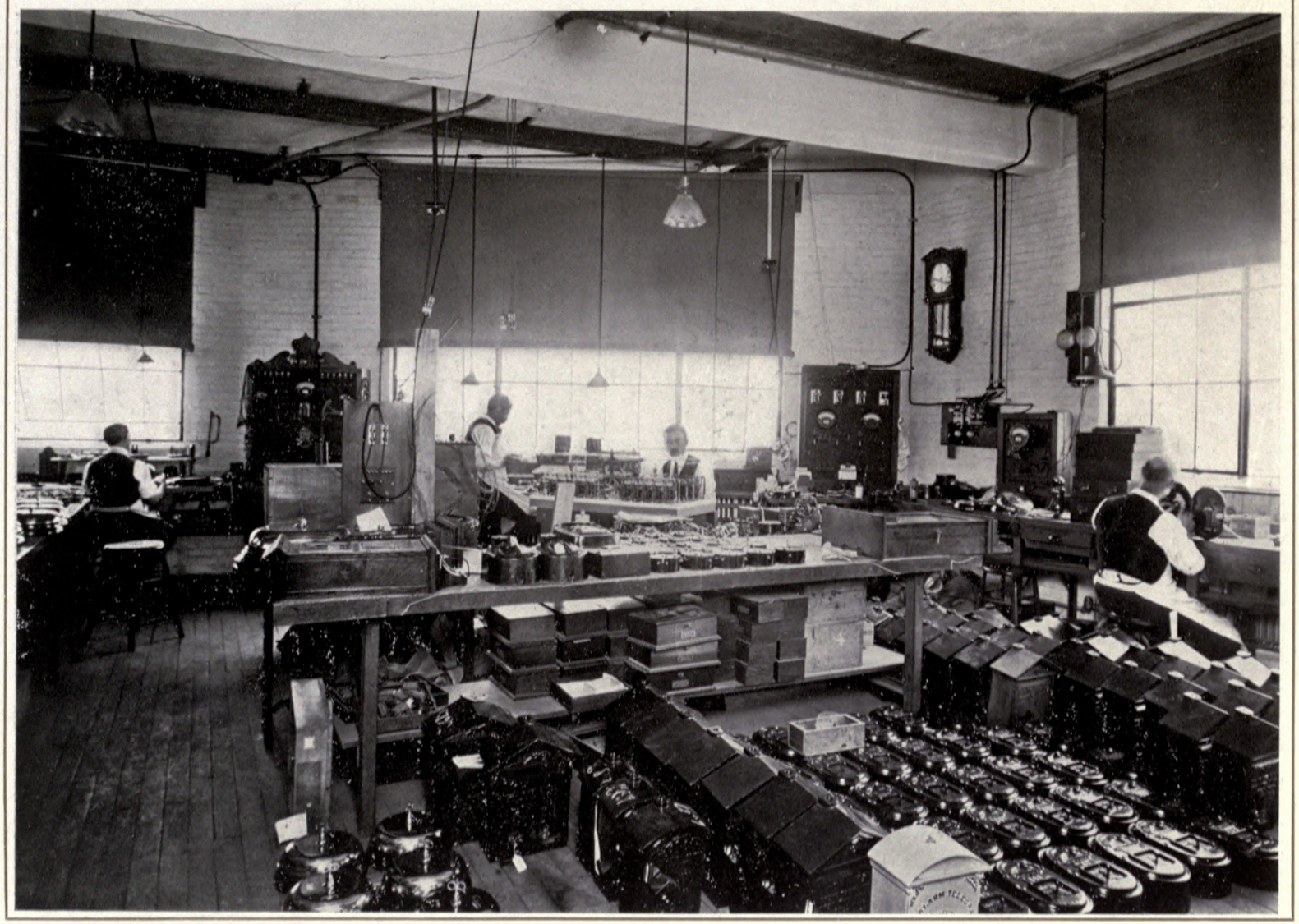
ASSEMBLING DEPARTMENT.

In this department are assembled the finished parts and the apparatus made up in completed form.



SWITCHBOARD DEPARTMENT.

In this department all the switchboard work is done. On frames made for the purpose are started the marble or slate boards on which are installed the devices and wiring to make up a complete switchboard.



TESTING DEPARTMENT.

This department tests every piece of apparatus before it is shipped and is the most important department in the manufacture of apparatus. Every box, gong, repeater, indicator, register, etc., etc., is fully examined and tested before being shipped.

SHIPPING DEPARTMENT.

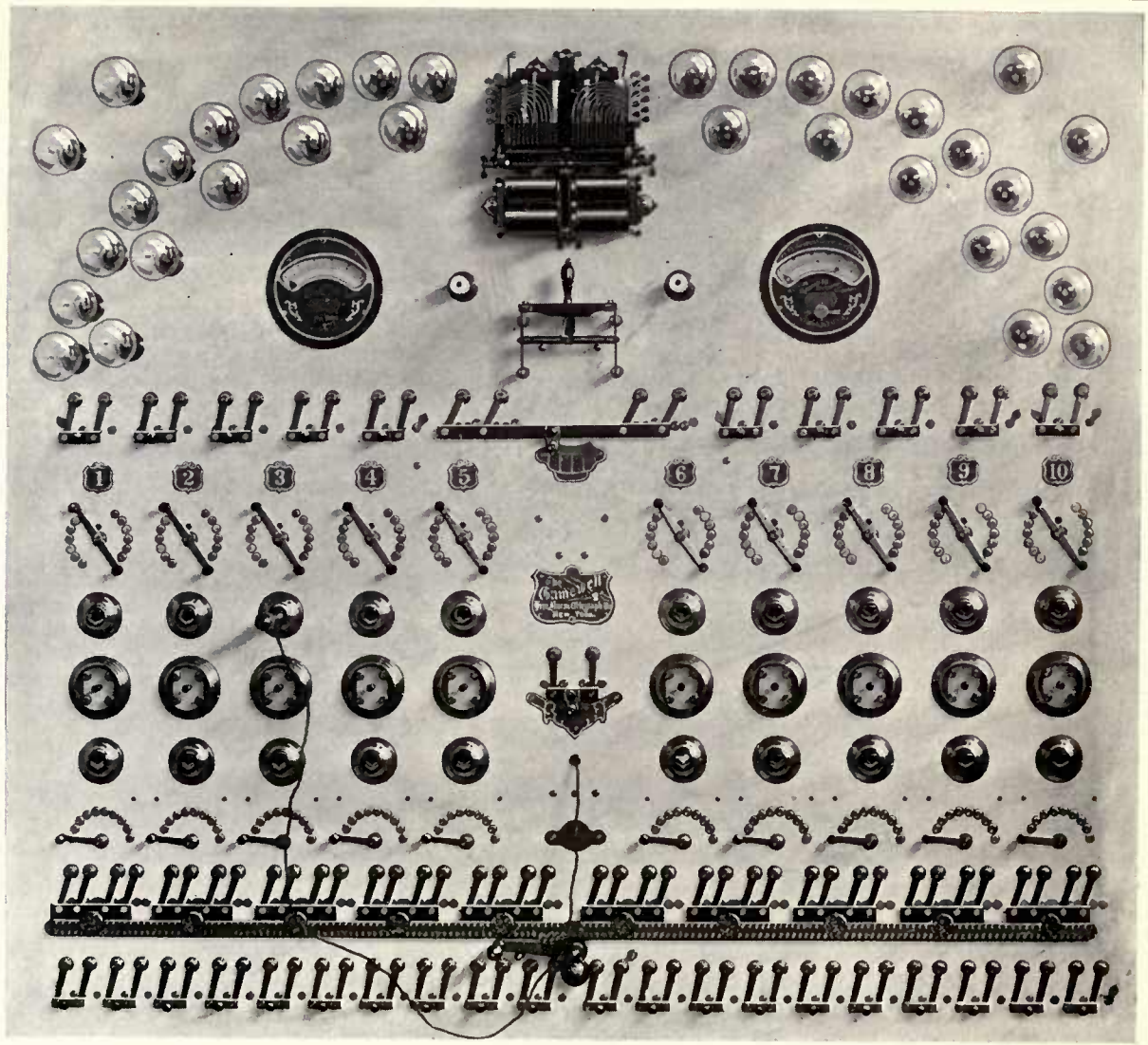
FACTORY EXHIBIT ROOM.

In this department is kept a working model of each standard piece of apparatus and is used to demonstrate the use of each type of system.

ANOTHER SECTION OF FACTORY EXHIBIT.

FACTORY MUSEUM.

This department contains a model of practically every piece of fire alarm apparatus ever made or used for fire alarm purposes. It is most interesting to compare the difference between present day devices and those used many years ago.



AUTOMATIC STORAGE BATTERY SWITCHBOARD.

This represents a standard 10-circuit automatic storage battery switchboard and is equipped with all the modern devices for testing and automatically safe-guarding overload or underload currents while storing the batteries.

PALMER & OLIVER
NEW YORK